CS-11

Information Technology

Lecture notes on

(Artificial Intelligence)

For
MCA 1st Semester

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Artificial intelligence

It is the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable.

Intelligence is the computational part of the ability to achieve goals in the world. Varying kinds and degrees of intelligence occur in people, many animals and some machines.

Definitions of artificial intelligence

The automation of activities that we associate with human thinking activities such as decision making, problem solving learning.

[BELLMAN 1978]

The study of mental faculties through the use of computational models.

[CHARNIACHINAK AND MCDERMOTT 1985]

The art of creating machines that perform functions that require intelligence when performed by people

[KURZWELL 1990]

The branch of computer science that is concerned with the automation of intelligent behaviour

[LUGER &STUBBLEFIELD 1993]

According to this definition computer system can be classified into the following categories

- systems that act like humans
- system that think like humans
- system that think rationally
- system that act rationally

Importance of artificial intelligence important

- **AI automates repetitive learning and discovery through data.** But AI is different from hardware-driven, robotic automation. Instead of automating manual tasks, AI performs frequent, high-volume, computerized tasks reliably and without fatigue. For this type of automation, human inquiry is still essential to set up the system and ask the right questions.

- **AI adds intelligence** to existing products. In most cases, AI will not be sold as an individual application. Rather, products you already use will be improved with AI capabilities, much like Siri was added as a feature to a new generation of Apple products. Automation, conversational platforms, bots and smart machines can be combined with large amounts of data to improve many technologies at home and in the workplace, from security intelligence to investment analysis.

- **AI adapts through progressive learning algorithms** to let the data do the programming. AI finds structure and regularities in data so that the algorithm acquires a skill: The algorithm becomes a classifier or a predictor. So, just as the algorithm can teach itself how to play chess, it can teach itself what product to recommend next online. And the models adapt when given new data. Back propagation is an AI technique that allows the model to adjust, through training and added data, when the first answer is not quite right.

- **AI analyzes more and deeper data** using neural networks that have many hidden layers. Building a fraud detection system with five hidden layers was almost impossible a few years ago. All that has changed with incredible computer power and big data. You need lots of data to train deep learning models because they learn directly from the data. The more data you can feed them, the more accurate they become.

- **AI achieves incredible accuracy** through deep neural networks – which was previously impossible. For example, your interactions with Alexa, Google Search and Google Photos are all based on deep learning – and they keep getting more accurate the more we use them. In the medical field, AI techniques from deep learning, image classification and object recognition can now be used to find cancer on MRIs with the same accuracy as highly trained radiologists.

- **AI gets the most out of data.** When algorithms are self-learning, the data itself can become intellectual property. The answers are in the data; you just have to apply AI to get them out. Since the role of the data is now more important than ever before, it can create a competitive advantage. If you have the best data in a competitive industry, even if everyone is applying similar techniques, the best data will win.

Challenges of using artificial intelligence

Artificial intelligence is going to change every industry, but we have to understand its limits.

The principle limitation of AI is that it learns from the data. There is no other way in which knowledge can be incorporated. That means any inaccuracies in the data will be reflected in the results. And any additional layers of prediction or analysis have to be added separately.

Today's AI systems are trained to do a clearly defined task. The system that plays poker cannot play solitaire or chess. The system that detects fraud cannot drive a car or give you legal advice. In fact, an AI system that detects health care fraud cannot accurately detect tax fraud or warranty claims fraud.

In other words, these systems are very, very specialized. They are focused on a single task and are far from behaving like humans.

Likewise, self-learning systems are not autonomous systems. The imagined AI technologies that you see in movies and TV are still science fiction. But computers that can probe complex data to learn and perfect specific tasks are becoming quite common